

REMARKS

This Amendment is responsive to the Office Action mailed April 5, 2007. After entry of this Amendment, claims 1-17 are pending in this application and subject to examination. The specification is amended to correct minor spelling informalities. Claim 2 is cancelled. Claim 1 is amended to incorporate the subject matter of cancelled claim 2. Claim 3 is amended to depend from claim 1 instead of claim 2. Claims 1 and 3-17 were also amended to place them in proper United States format and to correct minor grammatical and punctuation informalities. No new matter has been added.

Reconsideration of the application as amended is respectfully requested in view of the following remarks.

Objection to the Specification

The specification stands objected to for containing typographical errors. Specifically, the Examiners states that the word "or" at line 2 of paragraph 3 on page 4 should read "of" and that paragraph 5, page 6 contains the misspelling "pf." Applicants reviewed the first sentence of paragraph 3 on page 4 and note that it correctly reads "Surprisingly, the objective strived at could be reached by first wetting abrasive particles on the basis of molten *or* sintered corundums, zirconium corundums, silicon carbide and boron carbide ..." As such, Applicants did not amend this sentence. Applicants amended the specification at paragraph 5 on page 6 to correct the misspelling "pf." As requested by the Examiner, Applicants reviewed the specification for all possible minor errors and amended the specification to correct these informalities. Applicants believe these amendments obviate the objection to the specification and respectfully request its withdrawal

Rejection Under 35 U.S.C. § 112, First Paragraph

Claims 1 and 4-13 stand rejected under 35 U.S.C. § 112, first paragraph, as not enabled. Specifically, the Examiner asserts that the present specification is not enabled for non-silicate binding agents and is enabled for silicate binding agents only. Applicants respectfully traverse.

However, in the interest of expediting prosecution, Applicants have cancelled dependent claim 2 and amended claim 1 to incorporate the subject matter of cancelled claim 2. Furthermore, claim 3 is amended to depend from claim 1 instead of claim 2. Applicants believe these amendments obviate the enablement rejection of claims 1 and 4-13 and respectfully request its withdrawal.

Rejection Under 35 U.S.C. § 103(a)

Claims 1-13 and 17

Claims 1-13 and 17 stand rejected under 35 U.S.C. § 103(a) as obvious over EP 0 532 261 (hereinafter, the "'261 application") in view of U.S. Pat. No. 6,641,941 B2 to Yamada et al. (hereinafter, "Yamada"). Specifically, the Examiner concludes that claims 1-17 are obvious on the basis that (1) the '261 application teaches a coated abrasive particle, (2) Yamada teaches a complex oxide of yttria-alumina that provides both good corrosion resistance and high peel strength, and (3) persons of ordinary skill in the art would have been motivated to replace the coating of the '261 application with the complex oxide of Yamada in order to improve adhesion of the coating and enhance corrosive resistance of the abrasive particle. Applicants respectfully traverse.

In general, the '261 application teaches metal coated, cubic boron nitride abrasive particles for use in abrasive tools. *See* Abstract of the '261 application. The cubic boron nitride abrasive particle of the '261 application is first coated with a metal that chemically bonds with the surface of the particle to form a primary layer of a metallic carbide or nitride. *See* page 3, lines 12-18 of the '261 application. The abrasive particle is then coated with a second layer of metal. *See* page 3, line 50 to page 2, line 4 of the '261 application. The '261 application does not disclose abrasive particles coated with a sheathing comprising (1) an aqueous binding agent comprising a silicate and (2) a fine grained complex oxide, wherein the complex oxide comprises $A_xB_yO_z$ where A and B are different elements and x and y are greater than zero, and z corresponding to a product of the sum of (x+y) multiplied by a factor between 1.5 and 2.5, as required by claim 1 of the present application.

In general, Yamada teaches yttria-alumina complex oxides and their use as corrosion resistant films for apparatuses in semi-conductor production. *See* column 1, lines 14-54 of Yamada. Specifically, the films are used to resist corrosion from halogen-based corrosive gases. *See* column 1, lines 21-26 of Yamada. The yttria-alumina complex oxides are sprayed onto the substrate surface and may be heat-treated to improve peel strength of the film. *See* column 4, lines 12-43 of Yamada. Like the '261 application, Yamada does not disclose abrasive particles coated with a sheathing comprising (1) an aqueous binding agent comprising a silicate and (2) a fine grained complex oxide, wherein the complex oxide comprises $A_xB_yO_z$ where A and B are different elements and x and y are greater than zero, and z corresponding to a product of the sum of (x+y) multiplied by a factor between 1.5 and 2.5, as required by claim 1 of the present application.

Neither the '261 application nor Yamada, either alone or in combination, renders claims 1-13 and 17 *prima facie* obvious because these references fail to teach or suggest all of the limitations of claim 1. To establish *prima facie* obviousness of a claimed invention, all of the claim limitations must be taught or suggested by the prior art. *See* MPEP § 2143.03 (citing *In re Royka*, 490 F.2d 981, 180 USPQ 580 (CCPA 1974)). Claim 1 of the present application requires that claimed abrasive particles be coated with a sheathing comprising (1) an aqueous binding agent comprising a silicate and (2) a fine grained complex oxide, wherein the complex oxide comprises $A_xB_yO_z$ where A and B are different elements and x and y are greater than zero, and z corresponding to a product of the sum of (x+y) multiplied by a factor between 1.5 and 2.5. As pointed out above, neither the '261 application nor Yamada disclose coatings comprising either of these two components. Please note that the present specification at page 1, lines 13-15, defines A of the formula $A_xB_yO_z$ as the metals of the periodic table of the elements, while B of this formula is defined as the amphoteric elements of the periodic table. Applicants have informed the undersigned that the yttria-alumina complex oxides of Yamada do not correspond to the claimed complex oxides comprising the formula $A_xB_yO_z$, where A and B are as defined above. Therefore, because neither the '261 application nor Yamada, alone or in combination, teach or suggest all of the limitations of claim 1, the Examiner has failed to establish that claim 1 is *prima facie* obvious.

In addition, claim 1 is not *prima facie* obvious over the '261 application in view of Yamada, since the Examiner has failed to provide any basis for establishing that these references can be combined as proposed with a reasonable expectation of success. A reasonable expectation of success must be established for a proposed combination of references to render claims *prima facie* obvious. See MPEP § 2143.02 (citing *In re Merck & Co., Inc.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986)) Since no basis has been provided that the metal coatings on the abrasive particles of the '261 application can be substituted by the complex oxide films of Yamada with a reasonable expectation of success, the Examiner has failed to establish that claim 1 is *prima facie* obvious.

Assuming, *arguendo*, that the combination of the '261 application and Yamada did teach or suggest all of the limitations of claim 1, claim 1 is nonetheless nonobvious since these references are not properly combinable. This is because the Examiner has not sufficiently identified reasons why persons of ordinary skill in the art would have been motivated to combine the teachings of these references so as to encompass the present claims. As pointed out above, the only motivations asserted by the Examiner to replace the coating of the '261 application with the complex oxide films of Yamada is a purported desire of persons skilled in the art to improve adhesion of the coating and enhance corrosive resistance of the abrasive particle.

First, Applicants respectfully disagree that persons of ordinary skill in the art would be motivated to substitute the metal coatings on the abrasive particles of the '261 application with the complex oxide films of Yamada in order to enhance their corrosive resistance. The '261 application does not teach that enhanced corrosive resistance of its abrasive particles is a desirable characteristic, but does teach that abrasive tools comprising its coated particles should exhibit "improved particle retention, lubrication and thermal diffusion characteristics." See page 2, lines 28-33 of the '261 application. Yamada does not teach that its complex oxide films exhibit any of these characteristics. As such, persons of skill of ordinary skill in the art would be not be motivated to substitute the metal coatings on the abrasive particles of the '261 application with the complex oxide films of Yamada, since there is no indication that abrasive tools comprising

such filmed particles would possess improved particle retention, lubrication and thermal diffusion characteristics.

Second, persons of ordinary skill in the art would not be motivated to substitute the metal coatings on the abrasive particles of the '261 application with the complex oxide films of Yamada in order to improve their coating adhesion. The primary metal coatings of the abrasive particles of the '261 application are applied in a manner that results in the formation of a metal carbide or metal nitride layer by *chemical bonding* of the metal to the particle surface. *See* page 3, lines 12-49 of the '261 application. The one or more secondary coatings of metal are then applied using methods such as electroless, electrolytic, salt bath, and vapor deposition techniques. *See* page 3, line 50 to page 4, line 2 of the '261 application. In contrast, powders of the complex oxides of Yamada are merely sprayed onto the substrate surface and may be compressed by force or heat treatment to prevent particle generation from the film surface. *See* column 4, lines 12-43 and column 10, lines 34-38 of Yamada. Thus, substituting the metal coatings on the abrasive particles of the '261 application with the complex oxide films of Yamada would likely result in *decreased* coating adhesion on the abrasive particles, since the complex oxide films would not be chemically bonded, and thus more strongly adhered, to the substrate surface.

Furthermore, the '261 application and Yamada are not properly combinable because the respective uses of the metal coatings of the '261 application and the complex oxides of Yamada are non-analogous. The '261 application metal coatings are used to coat boron nitride abrasive particles so that abrasive tools comprising such particles exhibit improved particle retention, lubrication, and thermal diffusion. *See* page 2, lines 23-41 of the '261 application. The Yamada complex oxides are used to form films on coat semi-conductor production apparatuses that are resistant to halogen-based corrosive gases. *See* column 1, lines 14-54 of Yamada. As such, persons of ordinary skill in the art would not be motivated to look to art directed to corrosion-resistant films for semi-conductor production applications, such as Yamada, in order to improve the abrasive particle coatings of the '261 application. Thus, since the '261 application and Yamada are not properly combinable, claim 1 is non-obvious.

Claim 1 is also non-obvious over the '261 application in view of Yamada because the Examiner has improperly relied on Yamada as the basis for rejecting claim 1, inasmuch as it is not analogous art. In order to rely on a reference as a basis for rejection under 35 U.S.C. § 103(a), the reference must be either be in the field of Applicant's endeavor or, if not, then be reasonably pertinent to the particular problem with which the inventor was concerned. MPEP § 2141.01(a) (citing *In re Oetiker*, 977 F.2d 1443, 1446 (Fed. Cir. 1992)) In general, the Applicants' field of endeavor is directed to abrasives. In contrast, Yamada is directed to corrosion resistant films for use in semi-conductor production apparatus. As such, persons skilled in the abrasives art would not be disposed to consider Yamada as a resource for improving abrasives.

Claim 1 is non-obvious and patentable over the cited art because (1) neither the '261 application nor Yamada, alone or in combination, contain each and every limitation of claim 1, (2) the Examiner has failed to provide a basis that the metal coatings on the abrasive particles of the '261 application can be substituted by the complex oxide films of Yamada with a reasonable expectation of success, (3) persons skilled in the art would not be motivated to combine the teachings of these patents so as to encompass the invention of claim 1, and (3) as non-analogous art, Yamada was improperly relied upon as the basis for the rejection. Furthermore, since claims 2-13 and 17 depend directly or indirectly from claim 1, they are likewise non-obvious and patentable over both the '261 application and Yamada, either alone or in combination.

As such, Applicants respectfully request withdrawal of this rejection.

Claims 14-16

Claims 14-16 stand rejected under 35 U.S.C. § 103(a) as obvious over EP 0 532 261 (hereinafter, the "'261 application") in view of U.S. Pat. No. 6,641,941 B2 to Yamada et al. (hereinafter, "Yamada"). Specifically, the Examiner appears to assert that these claims are rendered obvious because Yamada teaches heat treatment in order to improve adhesion. Applicants respectfully traverse.

Applicants incorporate by reference the arguments made above with respect the '261 application and Yamada on the basis that they are equally applicable to claims 14- 16. Claim 14, as amended, claims a method for the treatment of abrasive particles comprising the steps of:

- (i) wetting the abrasive particles in a mixer with a liquid silicate binding agent;
- (ii) admixing the wetted abrasive particles with a fine grained complex oxide comprising $A_xB_yO_z$ until the complex oxide is substantially evenly distributed over the surface of the abrasive particles to form sheaths thereon, wherein A and B are different elements, x and y are greater than zero, and z corresponds to a product of the sum of (x+y) multiplied by a factor between 1.5 and 2.5; and
- (iii) heating the sheated abrasive particles to enhance adhesion of the sheathing.

As pointed out above, neither the '261 application nor Yamada disclose liquid binding agents comprising silicate or fine grained complex oxides comprising $A_xB_yO_z$ where A and B are different elements, x and y are greater than zero, and z corresponds to a product of the sum of (x+y) multiplied by a factor between 1.5 and 2.5. As such, neither the '261 application nor Yamada can teach steps (i) and (ii). Thus, the Examiner has failed to establish that claim 14 is *prima facie* obvious because neither the '261 application nor Yamada, alone or in combination, teach or suggest all of its limitations. As such, claim 14 is non-obvious and patentable over the '261 application in view of Yamada. Furthermore, since claims 15 and 16 depend directly from claim 14, they are likewise non-obvious and patentable over these combined references.

As such, Applicants respectfully request withdrawal of this rejection.

In view of the above amendment and remarks, Applicants believe the pending application is in condition for allowance.

Applicant believes no fee is due with this Amendment. However, if a fee is due, please charge our Deposit Account No. 03-2775, under Order No. 13826-00016-US1 from which the undersigned is authorized to draw.

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Respectfully submitted,

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